FINAL

COMPLIANCE EVALUATION INSPECTION REPORT
ASARCO INCORPORATED
EAST HELENA PRIMARY LEAD SMELTER
EAST HELENA, MONTANA

Prepared for:

Water Management Division (8WM-C)
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and

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EPA

NPDES Compliance Inspection Report

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Section A: National Data System Coding

Transaction Code	NPDES	yr/mo/day	Inspection Type	Inspector	Fac Type
1 N 2 5	3 11	12 940404 17	18 C	19 C	20 2

Remarks

21 SAIC - Contractor 66

Reserved	Facility Evaluation Rating	BI	QA	Reserved
67 69	70 2	71 N	72 N	73 74 75 80

Section B: Facility Data

Name and Location of Facility Inspected	Entry Time/Date	Permit Effective Date
ASARCO Inc's East Helena Lead Smelter East Helena Plant P.O. Box 1230 East Helena, MT 59635	Entry Time ☒ AM ☐ PM 10:00 Exit Time/Date 1:00pm 4/5/94	Permit Expiration Date

Name(s) of On-Site Representative(s)	Title(s)	Phone No(s)
Jon C. Nickel	Env. Supervisor	(406) 227-7191
Darrell D. Shew	Plant Engineer	(406) 227-7173
Gary Hughes	Acting Plant Manager	

Name, Address of Responsible Official	Title	
Mr Michael C. Varner East Helena Plant P.O. Box 1230 East Helena MT 59635	Vice President, Environmental Operations Phone No. (406) 227-7191	Contacted ☐ Yes ☒ No

Section C: Areas Evaluated During Inspection

(S = Satisfactory, M = Marginal, U = Unsatisfactory, N = Not Evaluated)

U	Permit	S	Flow Measurement	S	Pretreatment	M	Operations & Maintenance
M	Records/Reports	N	Laboratory	N	Compliance Schedules	S	Sludge Disposal
M	Facility Site Review	M	Effluent/Receiving Waters	S	Self-Monitoring Program		Other:

Section D: Summary of Findings/Comments *(Attach additional sheets if necessary)*

See Report Narrative + Appendices

Name(s) and Signature(s) of Inspector(s)	Agency/Office/Telephone	Date
Wesley N. Ganter Wesley N. Ganter	SAIC/Denver/303-292-2074	4/11/94
Laurie Lamb Laurie Lamb	SAIC/Denver/303-292-2074	4/11/94

Signature of Reviewer	Agency/Office	Date
Bruce Kent Bruce Kent	EPA Reg VIII / 303 293-1263	6/21/94

Regulatory Office Use Only

Action Taken	Date	Compliance Status
		☐ Noncompliance ☐ Compliance

EPA Form 3560-3 (Rev. 3-85) Previous editions are obsolete.

1.0 INTRODUCTION AND BACKGROUND

Under the U.S. Environmental Protection Agency (EPA) Contract No. 68-C8-0066, Work Assignment No. C-5-5(E), Science Applications International Corporation (SAIC) is performing Compliance Evaluation Inspections of industries who discharge wastewater to Publicly Owned Treatment Works (POTWs) regulated under the National Pollutant Discharge Elimination System (NPDES) program. At the request of EPA Region VIII, SAIC inspected ASARCO Inc's (ASARCO) East Helena Primary Lead Smelter, located in East Helena, Montana.

On April 4 through April 5, 1994, Wesley Ganter and Laurie Lamb of SAIC and Paul Montgomery of EPA Region VIII inspected the facility. The on-site representatives for ASARCO were Jon C. Nickel, Environmental Supervisor, Darrell D. Shew, Plant Engineer, Gary Hughes, Acting Plant Manager, and from TETRA, an ASARCO contractor, Jim Pettinger, Process Chief for the High Density Sludge (HDS) treatment system.

The East Helena Smelter is an active primary lead smelter which occupies approximately 80 acres. The smelter is one of only five primary lead smelters still operating in the U.S. The smelter began operations in 1888 and continues today recovering base metals using a pyrometallurgical process. In addition to the smelter, from 1927 until 1972, Anaconda Company operated a zinc fuming plant to recover zinc from the smelter's waste slag. In 1972, the zinc fuming operation was purchased by ASARCO and continued to operate until 1982. Primary lead bullion produced within the East Helena smelter is further refined at other ASARCO facilities. In 1992, the facility produced 74,706 short tons (0.1494 billion pounds) of lead bullion. The facility also operates a metallurgical acid plant which produces 93% sulfuric acid. Expressed as 100% acid, the acid plant has a capacity of 232.5 tons per day (169.725 million pounds per year). ASARCO's East Helena facility employs approximately 360 people and operates three 8 hour shifts 365 days a year.

Due to the size and complexity of the ASARCO primary lead smelter, a brief overview of the smelting and acid production processes, the wastestreams associated with these processes, their applicability to Federal Clean Water Act Regulations, and the ongoing CERCLA activities are provided in the following paragraphs. Additional information related to these and other subjects is presented in the remainder of this report.

<u>Description of Operations:</u>

The following two paragraphs regarding the smelting operation have been excerpted from ASARCO's BMR submission dated October 8, 1993. A schematic of the smelting process is presented in Appendix A.

> "In general, ore concentrates are transported by rail car or trucks to the ASARCO plant concentrate storage and handling facility. At this facility, ore concentrates are mixed with selected proportions of siliceous flux, limestone flux, iron flux, and recycled by-product dust. The mixed ore is then sent to the sinter plant where sulfur is removed. The sulfur dioxide gas by-product is used in the acid plant to produce sulfuric acid. The sinter is then sent to the blast furnace for smelting.
>
> Products from the blast furnace are blast furnace bullion and slag. Molten blast furnace bullion is transported to the dross plant for separation and recovery of various metal products. The slag is cooled and solidified in molds before disposal on the slag pile. Products from the dross plant include lead bullion, copper matte and speiss. The lead is shipped to an ASARCO refinery in Omaha, Nebraska for further processing. The copper matte and speiss are granulated and both products are sent to copper smelters for further processing."

The East Helena acid plant converts sulfur dioxide (SO_2) to 93% sulfuric acid by a multistage process. Sulfur dioxide gasses from the sintering process are drawn through an electrostatic precipitator which removes 99% of the particulates. The gasses then pass through wet scrubbers and mist precipitators to remove any remaining particulates and exit as an optically clear gas. The gas than enters a converter in which the sulfur dioxide reacts with a cesium based catalyst to form sulfur trioxide (SO_3). The sulfur trioxide then passes through a single contact absorbing tower in which 98% sulfuric acid is produced. Because 98% sulfuric acid freezes at 30°F, the acid is diluted to 93% prior to distribution. A schematic of the acid plant is presented in Appendix C.

Wastewater Sources and Discharges

When discussing wastewaters generated within the smelter operation, the facility makes a clear distinction between two types of water: plant water and process water. By volume, the largest component within the smelter operation is the plant water.

Plant water consists of facility washdown, stormwater, miscellaneous handwashes, flows from the change house which include, boiler blowdown, laundry wash, respirator wash, handwash, and showers, and flows from the acid transfer sump which include Upper Lake sand filter backwash, acid plant boiler blowdown, and acid plant cooling tower conductivity blowdown. Cooling water is also used within the plant and these waters are typically discussed within the context of plant water. Plant water circulates throughout the plant within the plant water circuit. At any one time, the facility has estimated that approximately 650 gpm of plant water is circulating throughout the plant.

ASARCO uses the term process water when referring to the acid plant scrubber blowdown. The facility indicated that this wastestream is highly concentrated with arsenic and metals, and although it represents less than 10% of the total water flow within the plant, it contains more than 90% of the total arsenic and metals loading. The scrubber blowdown as well as some lesser sources of wastewater are recirculated within the process water circuit. The major components of the process water circuit include the wet scrubbers, the mist precipitators, the acid plant water storage facility, and the scrubber water reclamation facility.

The facility stated that even with constant reuse of water within the plant, the discharge of wastewater is a necessity due to the net water gain which occurs within the water circuits. Factors such as the moisture content of the ore, the relative humidity, and storm and ground water contributions create a net water gain that has been estimated to be 15 - 25 gpm on a yearly basis. The plant and process water circuits and the net water gain are discussed in detail in Section 3.3 of this report. A schematic of the plant and process water circuits is presented as Appendix D.

Applicable Federal Regulations (Wastewater)

Federal effluent guidelines and categorical pretreatment standards applicable to the East Helena Smelter are found in 40 CFR Part 421 - Nonferrous Metals Manufacturing Point Source Category, Subpart G - Primary Lead Subcategory and Subpart I - Metallurgical Acid Plants Subcategory. Any discharge of process wastestreams to the East Helena POTW from the facility would be subject to Pretreatment Standards for Existing Sources. Discharges from the employee handwash, respirator wash, facility washdown, and laundering of uniforms would be subject to 40 CFR Part 421.75, while the acid plant scrubber blowdown is subject to 40 CFR Part 421.95. Any discharge from the facility directly to surface waters (Prickly Pear Creek, Lower Lake or Upper Lake) would be subject to the effluent guidelines established in 40 CFR Part 421 and water quality standards, and would require an NPDES Permit.

Discharges of wastewater to Lower Lake and other land application practices, such as dust suppression, may be subject to Federal Underground Injection Control (UIC) regulations and/or State of Montana groundwater regulations which may require additional permits.

The ASARCO East Helena primary lead smelter facility is listed on the National Priority List (NPL) and is currently involved in varying degrees of CERCLA activities. In an effort to expedite the Remedial Investigation/Feasibility Study, the East Helena smelter facility has been segregated into five operable units and a Record of Decision (ROD) for the Process Ponds Operable Unit was signed in November 1989. The Process Ponds Operable Unit consist of Lower Lake, former Thornock Lake, the speiss granulation pond and pit, and the old acid plant water treatment facility. Cleanup actions under the ROD are currently underway at the site.

The following report presents the findings of the ASARCO inspection as delineated on Form 3560-3, Section C. Appendix A presents a schematic of the smelting process. Appendix B presents a schematic of the HDS treatment system. Appendix C presents a schematic of the acid plant. Appendix D presents a water flow diagram. Appendix E presents a photo log of the East Helena Smelter.

2.0 SUMMARY OF FINDINGS

Findings

1. The facility discharges employee handwash wastewater from six selected wash stations to the East Helena POTW. The employee handwash wastewaters are categorical discharges subject to pretreatment standards listed in 40 CFR Part 421.75. The categorical wastestreams are sampled prior to mixing with sanitary discharges from bathrooms. The facility reported no knowledge of additional categorical wastestreams directed to the East Helena POTW.

2. The facility submitted a Baseline Monitoring Report (BMR) on January 16, 1985 for the discharge of categorical wastestreams to the East Helena POTW. The BMR was approved except for the omission of the compliance plan. Although discharges had occurred for several years, the facility achieved compliance on April 10, 1987, one month after the required compliance date of March 9, 1987. The facility has been submitting semi-annual reports since January 1, 1988 indicating continued compliance with the applicable categorical pretreatment standards.

3. The facility does not currently discharge treated effluent from the newly installed HDS system to the East Helena POTW. Instead, this treated effluent is returned to the plant water circuit via the acid transfer sump.

4. Due to the net water gain within the plant, the facility has reported that approximately 350,000 gallons of plant water is discharged to Lower Lake every one to two months. This discharge volume has been estimated by the facility as there is no in-line flow measurement device. Although Lower Lake does not contain a man-made outfall structure, it is likely that water in the unlined pond percolates to both groundwater and Prickly Pear Creek. Data collected during the CERCLA effort indicates that Lower Lake contributes pollutants to Prickly Pear Creek through a hydraulic connection between the two water bodies. The inspectors believe the reported 350,000 gallon discharge to Lower Lake is a conservative estimate, since water balances indicate a higher volume of water gain may be present.

5. Once the HDS treatment system had been constructed and tested, the facility had planned to discharge treated HDS system effluent to the East Helena POTW. Factors such as proposed local limits and demonstrated high levels of metals within the East Helena POTW sludge have forced the facility to actively consider alternative discharge options. The alternative discharge locations include Prickly Pear Creek, Upper Lake or Lower Lake. At the time of the inspection, facility representatives indicated that a discharge to Lower Lake appeared the most feasible alternative.

6. Prior to piping replacement programs in 1986 & 1987, the facility stated that all of the washdown sinks and floor drains in non-process areas of the plant (e.g. change house, warehouse, etc.) had been piped to the East Helena POTW. The piping programs redirected nearly all of those sinks and drains to the plant water circuit. The only remaining connections are those of the six reported employee handwash stations and sanitary discharges. Prior to 1986, flows and metals loadings to the East Helena POTW were greater than current loadings, as supported by data collected in 1985, 1986 & 1987.

7. ASARCO's Metallurgical Acid Plant has in the past and is currently generating wastes that are RCRA characteristic and listed. The sediment contained within Lower Lake is a RCRA listed hazardous waste and the effluent from the scrubber water reclamation facility appears to be a RCRA characteristic hazardous waste. Slag produced in the smelting process is exempt from regulation under RCRA Subtitle C. Although the smelter is currently listed on the NPL and contamination on-site is currently being addressed under CERCLA, the smelter is an ongoing manufacturing process and it is unclear why RCRA authorities have not been aware of the scrubber water reclamation facility effluent.

8. The facility uses plant water, which is known to contain elevated levels of arsenic and metals, for dust suppression activities on all roads within the plant site. Although total usage varies depending upon climatic conditions, the facility indicated that a usage rate could be determined given the size and frequency of use of each water truck. An estimate was not obtained during the inspection.

9. The facility reported on the water flow diagram, provided as Appendix D, that plant wide sanitary facilities resulted in a 43 gpm flow. Given the approximate number of employees (360), this 43 gpm flow would translate into each employee using 172 gallons of water per day. As per the diagram prepared by ASARCO, this flow does not include showers, laundering, or handwash facilities.

Requirements

1. The facility must immediately apply for an NPDES permit for all wastewater discharges from the lead smelting and acid plant. This includes discharges to Upper Lake, Lower Lake, and Prickly Pear Creek.

2. If the facility initiates discharging treated HDS system effluent to the East Helena POTW, all discharges must comply with applicable Federal Pretreatment Standards as well as local limits established for the East Helena POTW.

3. Pursuant to the State of Montana groundwater regulations, the land application of wastewaters as dust suppression and/or the introduction of plant water to Lower Lake may also require UIC and/or Montana groundwater discharge permits.

4. The facility is required to install a device capable of measuring flow of all wastewater discharges to Lower Lake. Records of measurement must be retained for a minimum of three years.

Recommendations

1. Due to the age of the facility and the extensive network of piping, smoke and/or dye testing of sewer lines may provide determinations of additional sewer connections of which ASARCO may be unaware.

2. The 172 gallon per person per day flow from plant wide sanitary facilities is much larger than standardly applied gallons per employee ratios. ASARCO should provide further explanation on how the 43 gpm number has been derived and provide a detailed water balance for the entire property.

3.0 INSPECTION OBSERVATIONS

3.1 PERMIT

Currently, there are two environmental control permits held by the East Helena Smelter. A Montana State Air Permit, No. 2557-01, and a stormwater run-off permit, Authorization MTR000072.

A current NPDES permit is not retained by ASARCO. A Montana Pollutant Discharge Elimination System (MPDES) permit was issued in June of 1974 for the discharge of non-contact cooling water to Prickly Pear Creek. This permit expired on December 31, 1978, and there is no record of the issuance of a renewal permit. Due to the lack of an approved pretreatment program for the East Helena POTW, there is no local discharge permit for the discharge of wastewater to the POTW. Proposed local limits have been established but are not final at this time. Once finalized, all discharges from ASARCO to the East Helena POTW will be subject to the local limits and federal categorical standards.

Although no permits are in place, ASARCO currently discharges employee handwash waters subject to categorical standards established in 40 CFR Part 421.75, Pretreatment Standards for Existing Sources. The standards provide daily maximum and maximum monthly average limitations for lead and zinc. EPA Region VIII is the control authority for this discharge and receives all semi-annual reports.

Although other categorical wastestreams are present within the plant, these wastestreams are not reported by the facility to be discharged to the POTW and are therefore not monitored or reported to any regulatory agency. These categorical wastestreams are incorporated within the plant water system which routinely discharges to Lower Lake and ASARCO has been discharging these wastestreams subject to federal effluent guidelines for an extended period of time. Since Lower Lake is hydraulically connected to Prickly Pear Creek, an NPDES permit is required for these discharges.

As indicated in the October 8, 1993 BMR, the facility is actively considering the direct discharge of treated HDS system effluent to either Prickly Pear Creek, Upper Lake, or Lower Lake. If the facility intends to discharge wastewaters to any of these waters, an NPDES permit will need to be obtained prior to the commencement of any such discharge.

3.2 RECORDS/REPORTS

Although record retention and content appears adequate from 1992 to the present, internal records relating to ASARCO's environmental controls and programs were destroyed in an October 1992 fire. Therefore, ASARCO's past records relating to wastewater discharge direction and characteristics are non-existent.

On October 8, 1993, ASARCO submitted a BMR for the potential discharge of treated wastewater from the HDS treatment system to the East Helena POTW. The BMR listed several categorical wastestreams within the plant and specified that the Combined Wastestream Formula would be used to develop alternative limits. It also indicated that treated effluent comprised of several categorical wastestreams was currently being re-introduced into the plant water circuit and not to the POTW. The BMR also contains information regarding the discharge of employee handwash water to the POTW. Within the BMR submission package, ASARCO also stated that they are actively considering the discharge of HDS system effluent to either Prickly Pear Creek, Upper Lake, or Lower Lake.

ASARCO submitted a Baseline Monitoring Report (BMR) on January 16, 1985 for the discharge of categorical wastestreams to the East Helena POTW. The BMR was acceptable except for the omission of the compliance plan. Discharges had occurred since 1982 and the facility achieved compliance on April 10, 1987, one month after the required compliance date of March 9, 1987. The facility has been submitting semi-annual reports since January 1, 1988 indicating continued compliance with the applicable categorical pretreatment standards.

In addition to the listed reports, the ongoing CERCLA actions at ASARCO have resulted in the generation of numerous other documents and reports. These reports, including the Record of Decision (ROD) for the Process Ponds Operable Unit and the Remedial Investigation/Feasibility Study (RIFS), provide additional information pertinent to ongoing and future manufacturing and cleanup operations at the facility. It is not clear how ongoing manufacturing operations were included in the CERCLA process.

3.3 SITE REVIEW

3.3.1 Water Sources

The ASARCO East Helena plant receives inputs of water from a variety of sources including: Upper Lake, East Helena city water, stormwater, water in the sinter plant fuel/air mixture, ore concentrates, groundwater infiltration, and Lower Lake. In 1991, ASARCO placed flow meters on incoming water sources for approximately five months to determine their average flow rate to the plant. The average incoming flow rate was determined to be approximately 215 to 234 gpm, with the differences in the estimates based on variable stormwater inputs. In addition, ASARCO emphasized that these flow rates can vary according to the percent moisture in the ore concentrates and the local humidity. Production rates at the plant are stable, so flow rate variances do not result from changes in production. The total incoming flow rate is comprised of the following sources.

Water from Upper Lake is used as make-up water in the acid plant cooling systems and within the HDS treatment system. ASARCO has determined an average inflow rate of 148 gpm from Upper Lake.

City water is used throughout the plant as a potable water source in sinks, the change house, boilers, and the cooling systems for the blast and reverberatory furnaces. The facility stated that high quality water is required to prevent scaling in the cooling systems. ASARCO has determined an average inflow rate of 53 gpm from the city water supply.

Stormwater, which enters the facility water system through stormwater drains, is collected and integrated into the plant water circuit. ASARCO has provided rough estimates of 3 to 22 gpm, depending on the season.

Water contained in the ore concentrates and the fuel/air combustion mixture used in the sinter plant are also sources of incoming water. ASARCO estimated an average rate of 9 gpm from the moisture in the concentrates and 2 gpm from the fuel/air combustion mixture.

A miscellaneous source of water to the facility is groundwater infiltration into the basement of the old ore storage/crushing building. ASARCO estimates a 0.5 gpm input from this source.

Lower Lake water is sometimes used as make-up water for the plant system in August, during periods of extensive dust suppression activities and high evaporation rates. Due to the infrequent nature and varying degrees of use, estimates of inputs from this source were not determined.

3.3.2 Plant and Process Water Circuits

As stated earlier, ASARCO differentiates two types of water within the facility water system: the plant water and the process water.

Plant Water Circuit

The term plant water is used to refer to all waters used and produced in all facilities of the plant except the process circuit of the acid plant. Plant water consists of facility washdown, stormwater, miscellaneous handwashes, flows from the change house which include; boiler blowdown, laundry wash, respirator wash, handwash, and showers, and flows from the acid transfer sump which include; Upper Lake sand filter backwash, acid plant boiler blowdown, acid plant cooling tower conductivity blowdown, and HDS system effluent. Plant water circulates throughout the plant within the plant water circuit.

The heart of the plant water circuit is the two 1-million gallon Lower Lake storage tanks. These tanks receive plant water effluent from two intermediate plant water collection locations; Thornock tank and the acid transfer sump. Thornock tank is a major intermediate collection station for plant water at the ASARCO East Helena Smelter. It receives gravity flows of stormwater from the majority of the facility, effluents from the change house, and cooling and washdown water from the sinter plant. Exceptions to this are the storm water flows from the ore storage yard and the six employee handwash stations.

The acid transfer sump is another intermediate collection station for plant water. It receives gravity flows from the Upper Lake sand filters, blowdown from the acid plant cooling tower and the acid plant boiler, and treated effluent from the HDS treatment system.

Water stored in the Lower Lake tanks is continually recycled for use throughout the facility. As indicated above, the plant water system experiences a net gain which must be discharged from the system periodically to maintain storage capacity in the system. ASARCO stated that this discharge occurs approximately every two months, when one of the two 1-million gallon Lower Lake tanks reaches nearly 80% capacity. At that time plant water is pumped directly from Thornock tank to Lower Lake, thus bypassing the 1-million gallon Lower Lake tanks. Although, this discharge situation is stated to occur approximately once every two months, it is heavily dependant upon climatic conditions, the moisture content within the ore, and potential reuse of plant water for dust suppression. Dust suppression, coupled with evaporation, can be so intensive in late summer, that the discharges are often eliminated for an extended period of time. During this time it is not uncommon for Lower Lake water to be used as make-up water for the plant water circuit. At this time, an NPDES or groundwater discharge permit has not been issued by EPA or the State of Montana for the discharge of plant water to Lower Lake or for dust suppression.

The facility stated that during discharge situations, plant water continues to be used from the 1-million gallon Lower Lake tanks, typically reducing the stored volume by approximately four to five feet. Therefore, approximately 350,000 gallons of plant water are discharged to Lower Lake during these bypass events. Using the total plant water throughput estimate of 650 gpm provided by the facility, a retention time of approximately 20 hours can be calculated for the 1-million gallon Lower Lake tanks. Given the above conditions, bypass events would last for approximately 8.5 hours.

ASARCO recycles most of the water used at the plant in addition to receiving new inputs from the sources of water previously described. This results in a net water gain in the entire facility water system, ranging from approximately 15 to 25 gpm on a yearly basis. Using the low end of the estimate, this would translate into an approximate gain of 650,000 gallons per month which differs sharply from ASARCO's stated discharge volume of 350,000 every one to two months to Lower Lake. Although evaporation and dust suppression activities may be responsible for a portion of the difference, the differences between the estimated net gain and the stated discharge volume to Lower Lake remain unclear.

The following paragraphs provide additional information regarding major process areas of the plant.

Ore Storage Area

The ore storage area receives water input from stormwater only. Stormwater generated during heavy precipitation events is directed to a series of sumps. The sumps are designed to retain sediments and allow excess stormwater to exit as overland flow. The escaping stormwater flows in a northerly direction and either ponds or crosses the entrance road to the plant site. The stormwater from this section of the facility never enters either the plant or process water circuits. According to Jon Nickel, a stormwater containment system will be built here next year to capture and contain all stormwater flows from the ore storage area.

Sinter Plant

The ore concentrate is the origin for much of the water that enters the process water system. In addition to the moisture contained in the ore concentrates, additional water from the scrubber water reclamation facility is sprayed onto the concentrates prior to entering the sinter plant. This flow has been estimated at 5 gpm. As the concentrates are heated in the sinter plant, the water from the ore concentrates, estimated at 9 gpm, and the fuel/air combustion mixture, estimated at 2 gpm, is driven off into the SO_2 gas stream. The additional 5 gpm flow is lost to the atmosphere from the sintering process. Therefore, an 11 gpm flow is contained in the SO_2 gas stream that enters the acid plant and becomes part of the process water system.

The sinter plant is the major user of plant water. The facility estimated that as much as 80% of the entire 650 gpm flow of plant water is used within the sintering plant. Water is used in the cooling system, the washdown of the facility and the fire protection system. According to the plant engineer, all the washdown water used at the sinter plant is plant water, originating from the Lower Lake tanks. The largest flows are used in the washdown of the facility which contributes the majority of the contaminant load to the wastewater exiting the sinter plant. ASARCO is planning to redesign the drainage system to segregate the cooling water and washdown water discharge streams, allowing for the recycling of the cooling water within the sinter plant. Stormwater from the sinter plant area enters sumps located next to the plant that drain ultimately to Thornock tank.

Smelting Facility

The smelting facility uses water in the closed loop blast and reverberatory furnace cooling system and in the speiss granulation process. City water is used in the blast furnace cooling system to prevent scaling in the closed loop system. The facility stated that all of the furnace cooling water is recycled in the system. The only exception to this would occur when a furnace is replaced and the cooling water would then be discharged to the plant water drain system.

The speiss granulation air/mist process at the smelter uses water from the plant water system. The air/mist process is a new granulation system that reportedly consumes all water used in the process through evaporation and no wastewater is produced. The old water granulation process used volumes of water sufficient to lead to a ground water contamination problem (addressed under the CERCLA cleanup action) underlying the old granulation area. Stormwater runoff generated at the smelter enters the stormwater drains that flow to Thornock tank.

High Density Sludge Treatment System

The HDS treatment system receives wastewater from the scrubber water reclamation facility. Plant water is also introduced into the treatment system to dilute constituents in the scrubber water reclamation facility effluent to acceptable treatment concentrations. In the future, the facility plans to introduce Lower Lake water into the HDS system for treatment. At the time of the inspection, HDS system effluent was re-introduced into the plant water circuit.

Central Pumphouse

The central pumphouse, located in the center of the facility, controls water flows to the various facilities. Almost all water pipelines run through this pumphouse, with the exception of the pipelines to and from Thornock tank, Lower Lake, and the Lower Lake tanks. At this location, an old ground water well has been turned into a sump which collects groundwater flows from around the central pumphouse as well as flows from a sump in the basement of an old or storage building. When viewed, strong, but unidentifiable, odors emanated from the top of the sump in the central pumphouse.

Process Water Circuit

The process water system includes all waters used and produced in the acid plant process. Wastewaters produced include the wet scrubber blowdown, the mist precipitator blowdown, plate cooler backflush and scrubber water reclamation facility effluent.

Acid Plant Wet Scrubbers and Mist Precipitators

The SO_2 gas stream from the sintering plant enters the wet scrubbers for cleaning. Treated water from the scrubber water reclamation facility is used in the wet scrubbers to extract the particulates from the SO_2 gas stream. The SO_2 gas stream exits the wet scrubbers and enters the mist precipitators for further removal of impurities. Treated water from the scrubber water reclamation facility is also used in the mist precipitators. A total of 31 gpm of reclaimed scrubber water is used between the two gas treatment systems. In addition to the 31 gpm flow, water vapor in the gas stream passing through the scrubbers and mist precipitators results in a discharge flow rate of approximately 9 gpm to combine for a total flow of 40 gpm exiting these units. This discharge returns to the scrubber water reclamation facility. The water exiting the scrubber water reclamation facility is likely a RCRA characteristic waste due to its corrosivity (pH $<$ 2.0 s.u.) and toxicity (arsenic concentrations ranging from 1,000 to 2,000 mg/l).

In addition to the normal process flow through the wet scrubbers and mist precipitators, the units are cleaned periodically. The wet scrubbers are washed down twice a year with plant water. One mist precipitator is washed down each day on a 30 - 40 minute cycle. The effluent and sludge from these washdown processes returns to the scrubber water reclamation facility and then becomes integrated into the process water circuit.

Acid Plant Water Storage Facility

Two 40,000 gallon tanks are used for the storage of scrubber water reclamation facility effluent. From these tanks, effluent is either bled into the HDS treatment system, returned to the acid plant for use in the scrubbers and mist precipitators, or is directed to the sintering plant to be used as sinter moisturizer. In addition to the wastewater discharges from the wet scrubbers and mist precipitators, non-contact cooling water from the plate cooler backflush is directed to the 40,000 gallon storage tanks. A third tank is also available for the containment of spills within the acid plant. If a spill of non-treated process water occurred, this water would be directed to the third tank and then directed to the scrubber water reclamation facility. By using this tank, non-treated process water would not be co-mingled with treated process water within the 40,000 gallon tanks.

Scrubber Water Reclamation Facility

The reclamation facility consists of a sludge removal system which provides treatment for scrubber water prior to its introduction into the HDS system or its reuse in either the acid and/or sintering plants. Additional discussions regarding this operation is provided in Section 3.10.

3.4 FLOW MEASUREMENTS

The only flow measurement devices are located within the HDS treatment building. A magnetic flow meter had recently been purchased, but not yet installed, for measuring the effluent flow from the HDS treatment system. However, additional flow meters were operating within the HDS system to measure the flows entering the feed tank. All of the individual flow measurement devices are electronically connected to the Programmable Logic Control (PLC) system which is the master control panel for the HDS system. The PLC is capable of displaying up to the second flow measurements.

No additional flow meters are currently installed within the plant. Therefore, all flow values listed in the October 8 BMR submission are based upon estimates determined by either knowledge gained through past plant experience or through previous flow measurement investigations. ASARCO conducted such an investigation over a five month period from February to June in 1991 with the help of their contractors, Hydrometrics. The intent of the investigation was to determine flow values for individual components within the entire plant water balance. To do so, individual flow measurement devices were installed at key locations throughout the plant. This investigation resulted in a "point in time" analysis of water flows within the plant.

To more accurately determine the sources and relative flows which result in a net water gain within the plant water circuit, the Plant Engineer conducted a separate flow measurement investigation during this same time period in 1991. This investigation used the flow values provided by Hydrometrics and then developed more accurate estimates of the contributing sources and ultimate reuse and/or disposal options employed. Issues such as the moisture content within the ore and the number of gallons used for dust suppression are examples of conditions used to develop these estimates.

The results of both investigations were directly incorporated into the October 8, 1993 BMR and are most notably visible in the water flow diagram provided within the BMR and contained within Appendix D of this report. Although the majority of the flow measurement devices used by Hydrometrics had been removed, the inspection team viewed several of the flow measurement locations as well as supporting documentation from individual flow measurement stations. The facility maintain the flow records regarding these flow investigations.

Due to the current lack of an on-line flow measurement device, the facility is recommended to install a device capable of measuring all discharges to Lower Lake. Records of measurement should be retained for a minimum of three years.

3.5 LABORATORY

For semi-annual reporting purposes, wastewater samples are analyzed at ASARCO's laboratory in Salt Lake City, Utah. In addition to conducting wastewater and groundwater analyses for the East Helena Smelter, this lab also services several other ASARCO operations in the western U.S. This laboratory was not reviewed as part of this inspection.

An on-site laboratory is present, however, the primary function of this lab is for ore concentrate verification and mixing purposes. For wastewater samples, the on-site lab analyzes plant water and Lower Lake water daily process control samples for arsenic, pH, and conductivity. Analytical results determined by this laboratory are not used for reporting purposes. This lab was not reviewed as part of this inspection.

3.6 EFFLUENT/RECEIVING WATERS

The following four potential discharge pathways exist in and around the facility: the East Helena POTW, Prickly Pear Creek, Lower Lake, and Upper Lake. Wastewater discharged to the East Helena POTW consists of categorical wastewater generated in the six employee handwash stations as listed in the semi-annual reports and sanitary discharges from all rest rooms. These wastestreams are piped directly to the sanitary sewer system. There are no other reported discharges of wastewater to the East Helena POTW.

The facility reported on the water flow diagram, provided as Appendix D, that plant wide sanitary facilities resulted in a 43 gpm flow. Given the approximate number of employees (360), this 43 gpm flow would translate into each employee using 172 gallons of water per day. As per the diagram prepared by ASARCO, this flow does not include showers, laundering, or handwash facilities. This 172 gallon per person per day flow is large and requires further explanation.

At the time of the inspection, although piping had been constructed, connections were not made between the effluent line from the HDS system and the East Helena POTW. The effluent from the HDS system was re-introduced into the plant water circuit via the acid transfer sump.

The facility indicated that plant water is only introduced into Lower Lake when storage capacity in one of the two 1-million gallon Lower Lake tanks becomes compromised due to the continuous water gain experienced within the plant. ASARCO stated that even during these periods of flow diversion, the level of Lower Lake, which is an unlined pond with a capacity of 11 million gallons, is not noticeably altered as evaporation and infiltration to groundwater and Prickly Pear Creek accommodate the addition. Because the facility has estimated the net water gain to be approximately 15 - 25 gpm on a yearly average, the evaporation, infiltration, and dust suppression operations are assumed to equalize the gain. There are no other reported discharges of wastewater to Lower Lake.

Discharges to Upper Lake are reportably non-existent. However, Upper Lake water is used for make-up to the cooling systems and make-up water for polymer/flocculent tanks used in the HDS system. Sand filters are installed at the intake structure and the backflush from these filters is directed to the plant water circuit via the acid plant transfer sump.

As discussed in Section 3.3.2, additional discharges occur as overland flow from stormwater collection sumps in the ore storage yard during heavy precipitation events. Of the sumps viewed, there was no distinct flow-away channel visible and the facility indicated that the flows typically pond, or during heavier events, flow in a northerly direction over the entrance road of the facility.

3.7 PRETREATMENT

As reported in the October 8, 1993 BMR, ASARCO had initially planned to discharge treated HDS effluent to the East Helena POTW. In response to this request, EPA Region VIII developed proposed Technically-Based Local Discharge Limitations (TBLDL's) which estimates maximum pollutant concentrations the City's POTW can receive and still protect treatment processes, sludge quality, and receiving waters. Development of estimated TBLDL's focused mainly on protecting the water quality in Prickly Pear Creek. EPA determined that to protect to protect water quality, ASARCO's discharge would have to meet the following limits:

Pollutant	TBLDL(mg/l)
As	0.156
Cd	0.000
Cr	0.886
Cu	0.023
Pb	0.000
Hg	0.000
Mo	0.000
Ni	0.113
Se	0.010
Ag	0.004
Zn	0.545

Final local limits are currently being derived by EPA Region VIII.

3.8 COMPLIANCE SCHEDULE

Other than activities required under CERCLA, there is no compliance schedule in effect for this facility. However, there are several existing conditions at the site which are directly applicable to RCRA regulations. The ASARCO East Helena Smelter and Metallurgical Acid Plant have in the past and are currently generating wastes that are RCRA characteristic and listed wastes. The solids and sludges contained in, and soon to be dredged from, Lower Lake are a listed hazardous waste (K065). The effluent from the scrubber water reclamation facility appears to be a characteristic RCRA waste, exhibiting the corrosivity characteristic (pH of less than 2.0) and probably the toxicity characteristic leach test since the arsenic concentrations are as high as 400 times the regulatory level for arsenic (5 mg/l). This is applicable since 40 CFR Part 261.24 states that where a waste contains less than 0.5 percent filterable solids, the waste itself, after filtering, is considered to be the extract.

Although the smelter is currently listed on the NPL and contamination on-site is currently being addressed under CERCLA, it is unclear why RCRA authorities have not addressed the scrubber water reclamation facility effluent, which is likely a RCRA characteristic waste. The operation is currently active and discharges from the scrubber water reclamation facility are not immediately directed to Lower Lake (they are treated in the HDS system prior to comingling with plant water). The solids present in the bottom of Lower Lake are a RCRA listed waste and are being addressed under the CERCLA action.

3.9 SELF-MONITORING PROGRAM

As required by 40 CFR Part 421.75, ASARCO samples and analyzes wastewater samples from the six employee handwash sinks on a semi-annual basis. The analytical results are reported as per 40 CFR Part 403.12 in a semi-annual report submitted in January and July of each year. Copies of the semi-annual reports are located in the EPA Montana office file.

For sampling the employee handwash discharges, the facility reported that individual five gallon car boys are positioned below each one of the regulated employee handwash sinks for a period of 24 hours. During washing, handwash water drains into the respective car boy and after the 24 hour period is complete, the individual car boys are shaken and samples from each are sent to the Salt Lake City lab for analysis. The method of preservation was not specified.

For sampling the HDS system effluent, ASARCO has purchased an ISCO composite sampler with the capability of collecting duplicate sequential samples. The sampler is located within the HDS system building and, once installed, will be capable of collecting samples prior to discharge to any of the potential receiving waters. Although not currently operating, HDS effluent samples had been collected and analyzed by ASARCO for performance evaluation purposes. Results of such sampling were not reviewed during the inspection.

In addition to the required semi-annual sampling and reporting, ASARCO conducts daily process control sampling of the plant water circuit and the water within Lower Lake. The grab samples are analyzed for arsenic, pH, and conductivity. The results of these analyses are retained by the facility. Due to the approximate 20 hour retention time of the plant water circuit, this daily sampling acts as an indicator of current plant operations. Higher than normal levels of arsenic or pH fluctuations may signal an upset somewhere within the plant water circuit. These analytical results are not used for reporting purposes.

As part of the ongoing CERCLA operations, sampling of Lower Lake, Prickly Pear Creek, and all existing ground water monitoring wells is conducted on a semi-annual basis with all analyses performed in the Salt Lake City lab. Results of such sampling events can be obtained from the CERCLA files.

3.10 OPERATIONS AND MAINTENANCE

The treatment of wastewater is performed by two separate treatment systems within the plant: the scrubber water reclamation facility; and the High Density Sludge (HDS) treatment system. Categorical wastestreams generated in the employee handwash stations receive no pretreatment prior to introduction into the East Helena sewer system.

<u>Scrubber Water Reclamation Facility</u>
The scrubber water reclamation facility is used to treat the highly concentrated acid plant scrubber blowdown referred to as process water. The system was installed in November of 1991 and prior to its installation, the process water was treated in the old acid plant treatment system, which has since been removed. It was the old acid plant treatment system which was a large contributor to localized groundwater contamination. Under CERCLA activities, the contaminated soils have been removed and a concrete pad has been installed.

As stated in Section 3.3.2 of this report, the process wastewaters generated within the acid plant are so concentrated and exhibit such a low pH, that preliminary treatment is required for either its reuse within the acid plant or its introduction into the HDS treatment system.

The scrubber water reclamation facility operates as a sludge removal system consisting of two underflow clarifiers and a belt filter press. The water exiting the clarifiers has an arsenic concentration ranging from 1000 - 2000 ppm and a pH of approximately 1.5 s.u. Once clarified, the water train is split into two separate flows. The portion of the flow reused as sinter moisturizer in the sintering plant receives additional treatment with the use of a neutralization tank and an SO_2 air stripper. The remaining portion does not receive any additional treatment and is piped directly to two 40,000 gallon storage tanks. Water within these tanks are either bled into the HDS system feed tank with a adjustable rate 10 gpm capacity pump or reused in the scrubbers and mist precipitators.

High Density Sludge (HDS) Treatment System

The first step in the HDS system is the accumulation and mixing of effluent from the scrubber water reclamation facility, plant water, and eventually Lower Lake water within the feed tank. Jim Pettinger, TETRA Process Chief, indicated that ideally, treated scrubber water would be diluted with plant water at a ratio of approximately 9:1 within the feed tank. In the future, this 9:1 ratio would conceivably be made up by a combination of plant water and Lower Lake water which would be used to dilute the scrubber water. At the time of the inspection, influent to the feed tank consisted of 40 gpm of plant water to 7.6 gpm of treated scrubber water.

Once combined in the feed tank, the wastewater is pumped to a first stage reactor tank, which combines the feed stream with a combination of return sludge from the first clarifier and hydrated lime slurry. This high density sludge wastewater is then piped to the first of two neutralization tanks which first elevate the pH with hydrated lime and then volatilize the arsenic with hydrogen peroxide. From the neutralization tanks, the wastewater flows to a polymer/flocculation addition tank and is then pumped to a center feed circular clarifier. A portion of the sludge generated within the clarifier is continuously returned to the first stage reactor, while the remaining sludge is pumped once per hour to a holding tank. The sludge within the holding tank is then pumped to the belt filter press.

In the initial design, the clarified wastewater would flow through two additional ferric sulfate tanks and then be pumped to sand filters for final treatment. However, when the flow was increased to 100 gpm during pilot testing, floc generated within the ferric sulfate tanks overwhelmed the sand filters, thus reducing effluent quality. To combat this problem, a second center feed clarifier has been installed to provide additional clarification. This clarifier was not operational at the time of the inspection but was scheduled to be put on-line by April 28, 1994. Due to the lack of the additional clarifier, the ferric sulfate tanks were operational but not in use at the time of the inspection.

Mr. Pettinger stated that without the use of the ferric sulfate tanks, the system was capable of reducing arsenic concentrations to approximately 3 ppm, but with their use, the arsenic concentrations should be reduced to approximately 0.5 ppm. For continuous process control purposes, a PLC monitoring system has been installed within the HDS system. The PLC analyzes up to the minute in-system conditions and recognizes process irregularities. If an upset was determined to be present, the PLC is capable of performing a system shutdown in which the discharge would be ceased.

No additional wastewater treatment is performed within the plant.

In an attempt to minimize the discharge of contaminated water to the East Helena POTW, ASARCO instituted a piping replacement program in 1986. The facility stated that prior to that year, all of the washdown sinks and floor drains in non-process areas of the plant (e.g. change house, warehouse, etc.) had been piped to the POTW. The piping program redirected nearly all of those sinks and drains to the plant water circuit. At the same time, many of the degraded pipes, which lead to infiltration of groundwater into the sewer system, were repaired. Prior to that time, more concentrated wastestreams were allowed to enter the East Helena sewer system, specifically the respirator wash wastestream which was reported to be in violation of the applicable pretreatment standards. A compliance schedule for respirator wash was issued and ASARCO complied by ceasing the discharge of this wastestream.

As stated in Section 3.3, another piping replacement program is scheduled to begin in the summer of 1994 in which the current co-mingling of cooling water and washdown water from the sinter plant would be segregated. By doing so, the cooling water would then be reused within the sinter plant and the washdown would continue to be directed to Thornock tank. In conjunction with this scheduled piping replacement program, areas of the coke yard which are poorly graded, would be regraded to eliminate ponding. Stormwater from this area would also be directed to the plant water circuit. ASARCO also intends to construct a tank for the storage water which accumulates in the ore yard.

By collecting daily process control samples from the plant water circuit, the facility can evaluate the effectiveness of the new HDS treatment system. Prior to the introduction of the HDS system effluent to the plant water circuit, the plant water contained approximately 5 ppm of arsenic. At the time of the inspection, the plant water contained approximately 1 ppm of arsenic. The Plant Engineer stated that this reduction of arsenic was an indicator that effective arsenic removal was occuring.

3.11 SLUDGE DISPOSAL

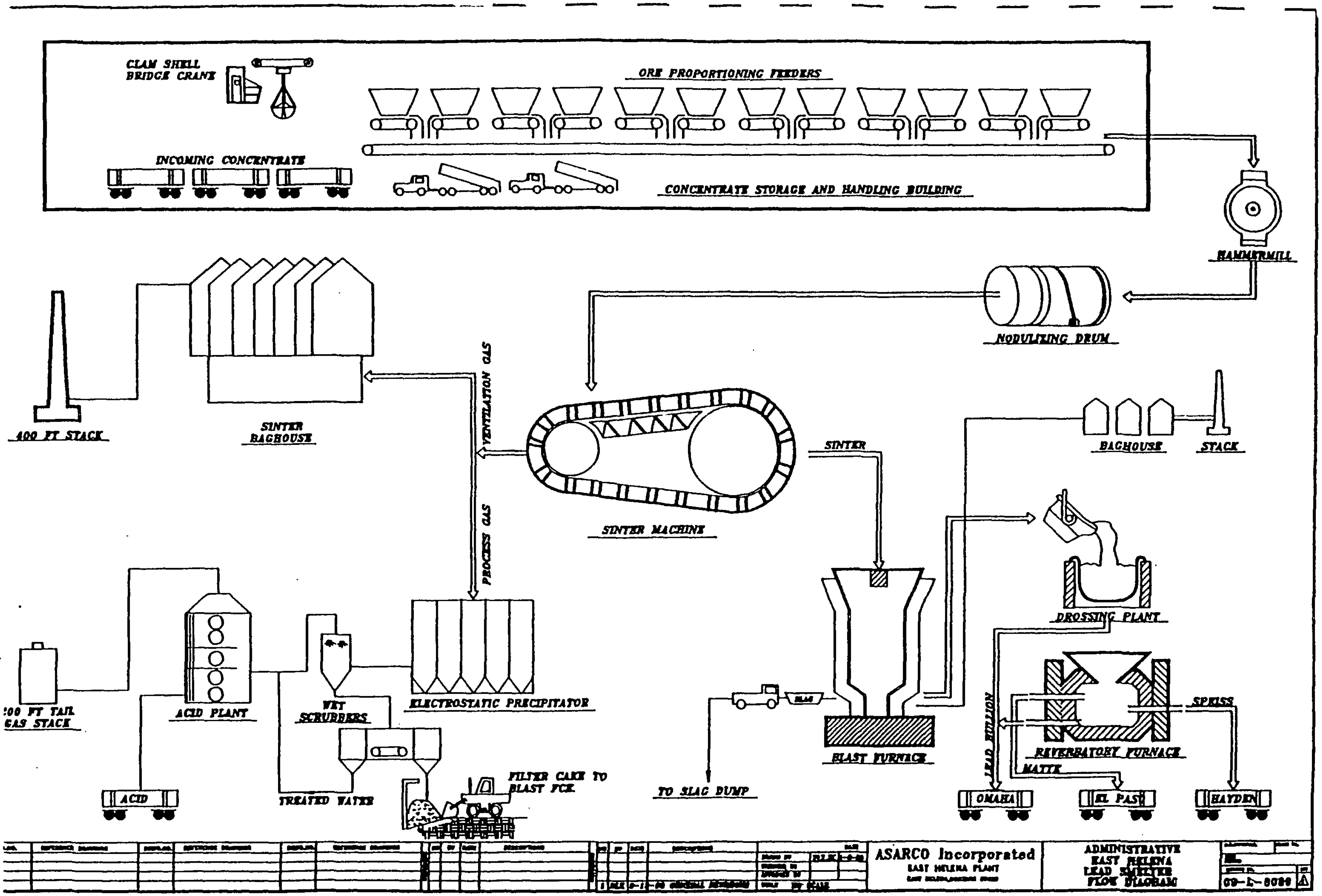
A belt filter press is used to dewater sludge generated within the scrubber water reclamation facility. Once dewatered to approximately 6 - 10% solids, the cake falls into a collection bin beneath the filter press. The cake is then removed with a front end loader and reused in the smelting process to recover metals. Filtrate is returned to the influent flow prior to clarification.

Sludge generated within the HDS treatment system is dewatered with a belt filter press to approximately 30% solids. This cake, which exhibits the characteristic yellow color of the HDS system, is also returned to the smelting process for metals recovery. The filtrate from this belt filter press is returned to the feed tank within the HDS system.

In addition to the sludges intentionally generated by treatment, particulates present within the plant water circuit accumulate within Thornock tank, the 1-million gallon Lower Lake tanks, and several stormwater collection sumps located in and around the ore storage yard. Periodically, ASARCO removes these accumulated sediments with two sump sucker trucks and returns the sediments to the smelter for processing. Once the remediation of Lower Lake begins, the sediments removed from Lower Lake will be dewatered with a portable belt filter press and the cake will be returned to the smelter for processing. The filtrate from the dewatering will be directed to the plant water circuit.

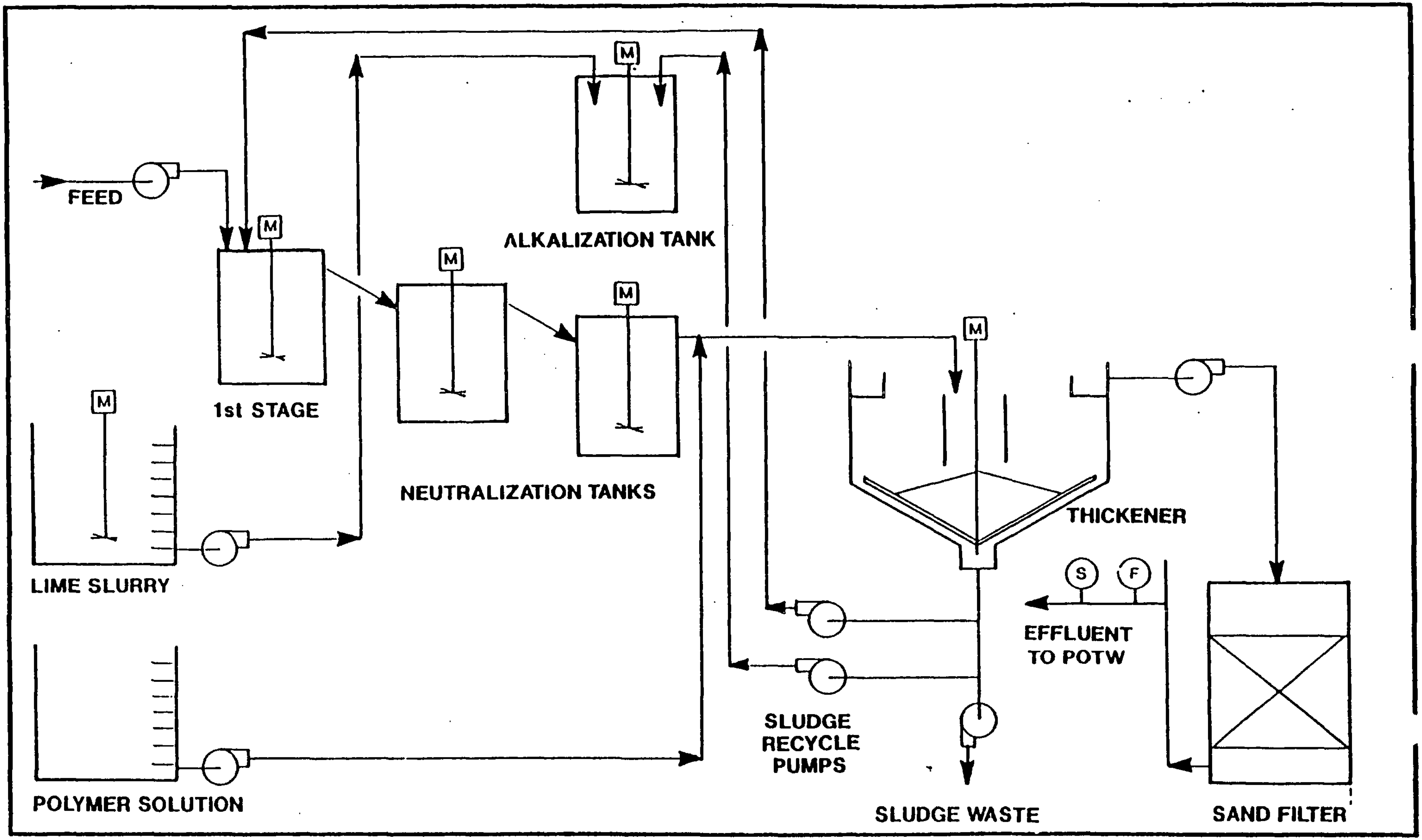
APPENDIX A

SMELTING PROCESS SCHEMATIC


CLAM SHELL BRIDGE CRANE
ORE PROPORTIONING FEEDERS
INCOMING CONCENTRATE
CONCENTRATE STORAGE AND HANDLING BUILDING
HAMMERMILL
NODULIZING DRUM
400 FT STACK
SINTER BAGHOUSE
VENTILATION GAS
PROCESS GAS
SINTER MACHINE
SINTER
BAGHOUSE
STACK
DROSSING PLANT
200 FT TAIL GAS STACK
ACID PLANT
WET SCRUBBERS
ELECTROSTATIC PRECIPITATOR
SLAG
TO SLAG DUMP
BLAST FURNACE
LEAD BULLION
SPEISS
REVERBATORY FURNACE
MATTE
ACID
TREATED WATER
FILTER CAKE TO BLAST FCE.
OMAHA
EL PASO
HAYDEN
ASARCO Incorporated
EAST HELENA PLANT
ADMINISTRATIVE
EAST HELENA
LEAD SMELTER
FLOW DIAGRAM
ORIGINAL DRAWING
NO SCALE

APPENDIX B

HDS TREATMENT SYSTEM SCHEMATIC

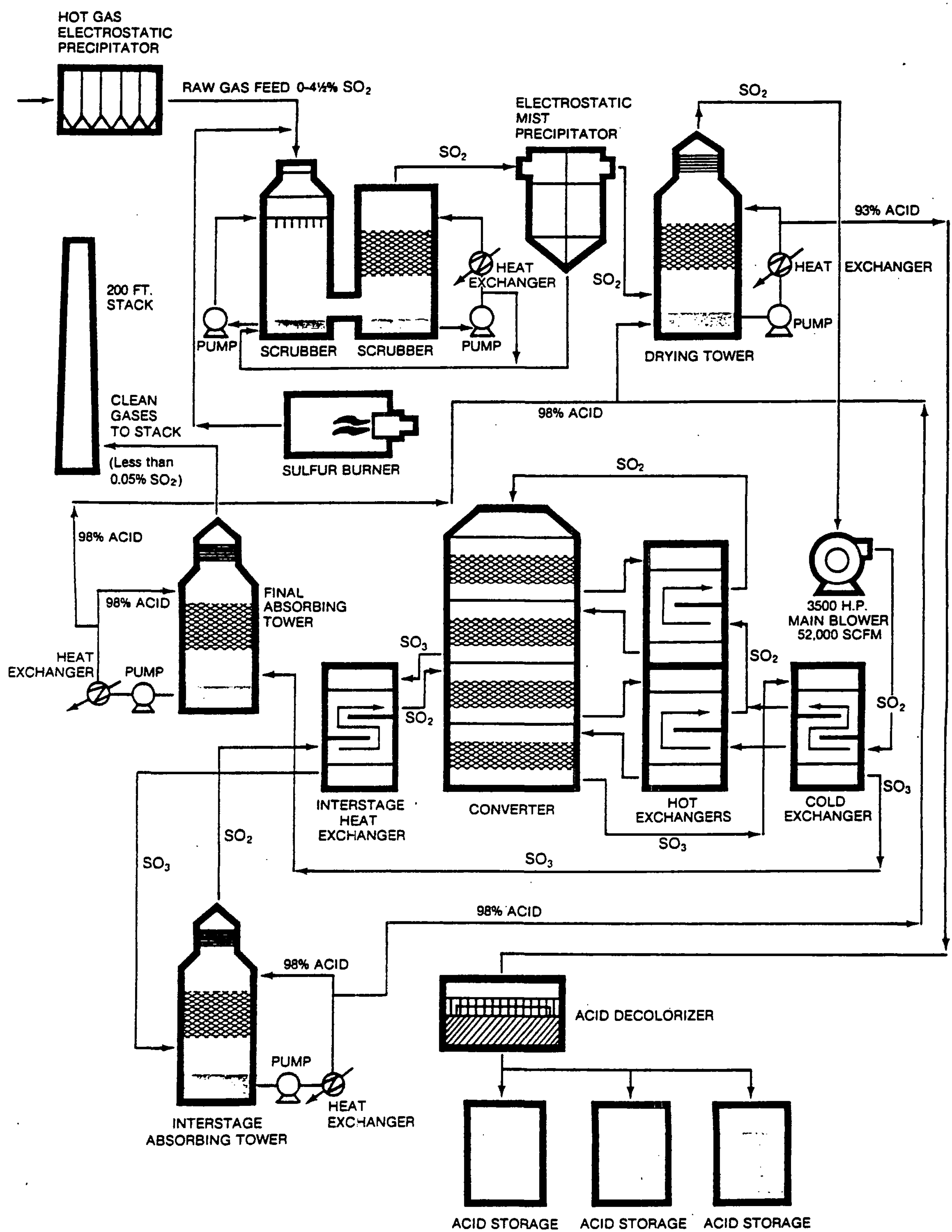


Proj. No: ASEH03
Dwg. No: S2493
Scale: NONE
Date: 8/24/93
Rev Date:

Figure 3.
ASARCO HDS™ Water Treatment Plant

APPENDIX C

METALLURGICAL ACID PLANT SCEMATIC



HOT GAS ELECTROSTATIC PRECIPITATOR
RAW GAS FEED 0-4½% SO_2
SO_2
ELECTROSTATIC MIST PRECIPITATOR
SO_2
93% ACID
HEAT EXCHANGER
HEAT EXCHANGER
SO_2
PUMP
SCRUBBER
SCRUBBER
PUMP
PUMP
DRYING TOWER
200 FT. STACK
CLEAN GASES TO STACK
(Less than 0.05% SO_2)
SULFUR BURNER
98% ACID
SO_2
98% ACID
98% ACID
FINAL ABSORBING TOWER
HEAT EXCHANGER
PUMP
3500 H.P. MAIN BLOWER 52,000 SCFM
SO_3
SO_2
SO_2
SO_2
SO_3
INTERSTAGE HEAT EXCHANGER
CONVERTER
HOT EXCHANGERS
COLD EXCHANGER
SO_2
SO_3
SO_3
SO_3
98% ACID
98% ACID
ACID DECOLORIZER
PUMP
HEAT EXCHANGER
INTERSTAGE ABSORBING TOWER
ACID STORAGE
ACID STORAGE
ACID STORAGE

APPENDIX D

EAST HELENA SMELTER WATER FLOW DIAGRAM

(Only Provided in the EPA Original)

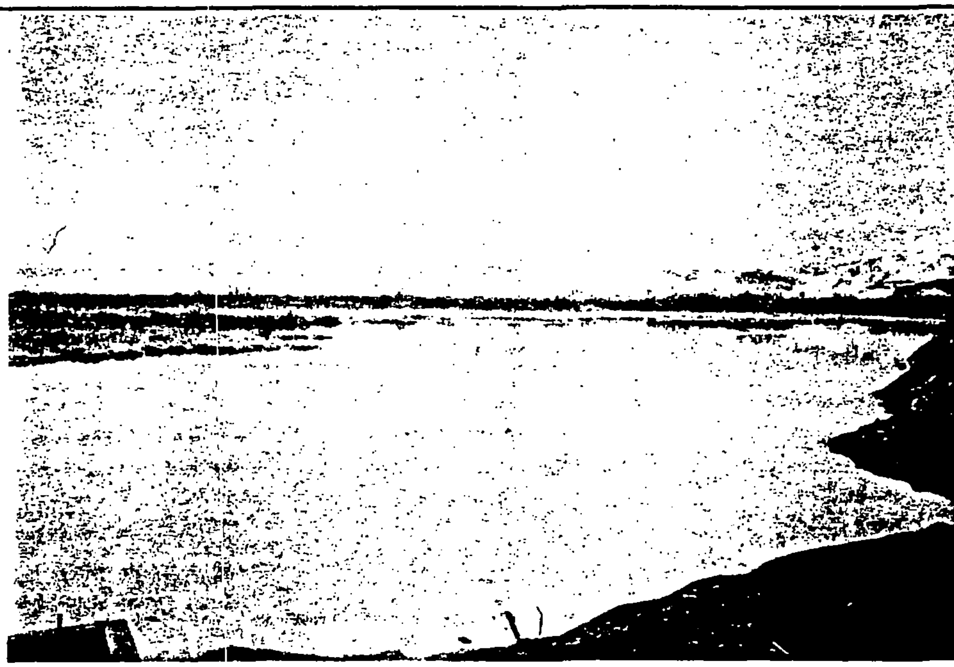
APPENDIX E

PHOTO LOG OF THE EAST HELENA SMELTER

PHOTO MOUNTING SHEET

Name of Site: ASARCO East Helena Smelter

Location: East Helena, Montana   EPA I.D. Number: NA



Picture No. 16 of 24

Date: 4/5/94

Time: 0930

General Direction Faced: S

Weather Conditions: Overcast w/ light snow

Type of Camera: Kodak

Comments: Upper Lake looking south

Picture No. 20 of 24

Date: 4/5/94

Time: 0930

General Direction Faced: W

Weather Conditions: Overcast w/ light snow

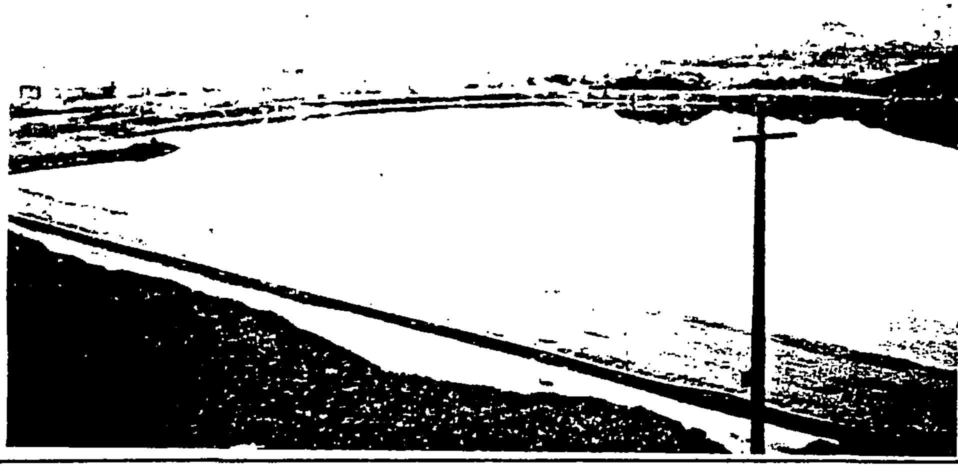
Type of Camera: Kodak

Comments: Lower Lake w/ acid plant in background

PHOTO MOUNTING SHEET

Name of Site: ASARCO East Helena Smelter

Location: East Helena, Montana EPA I.D. Number: NA



Picture No. 21 of 24

Date: 4/5/94

Time: 0930

General Direction Faced: SE

Weather Conditions: Overcast w/ light snow

Type of Camera: Kodak

Comments: Lower Lake with Prickly Pear running immediately behind visible pond berm.

Picture No. 19 of 24

Date: 4/5/94

Time: 0930

General Direction Faced: E

Weather Conditions: Overcast w/ light snow

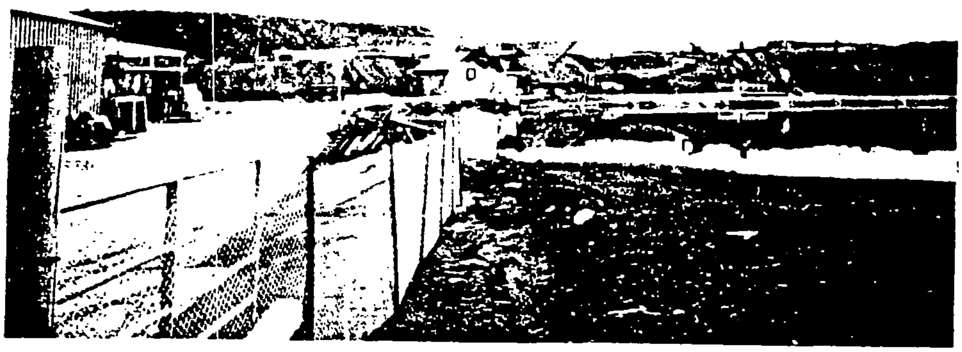
Type of Camera: Kodak

Comments: Discharge pipe from Thornock tank to Lower Lake visible in center of photo. Used when Lower Lake tanks are bypassed.

PHOTO MOUNTING SHEET

Name of Site: ASARCO East Helena Smelter

Location: East Helena, Montana   EPA I.D. Number: NA



Picture No. 18 of 24

Date: 4/5/94

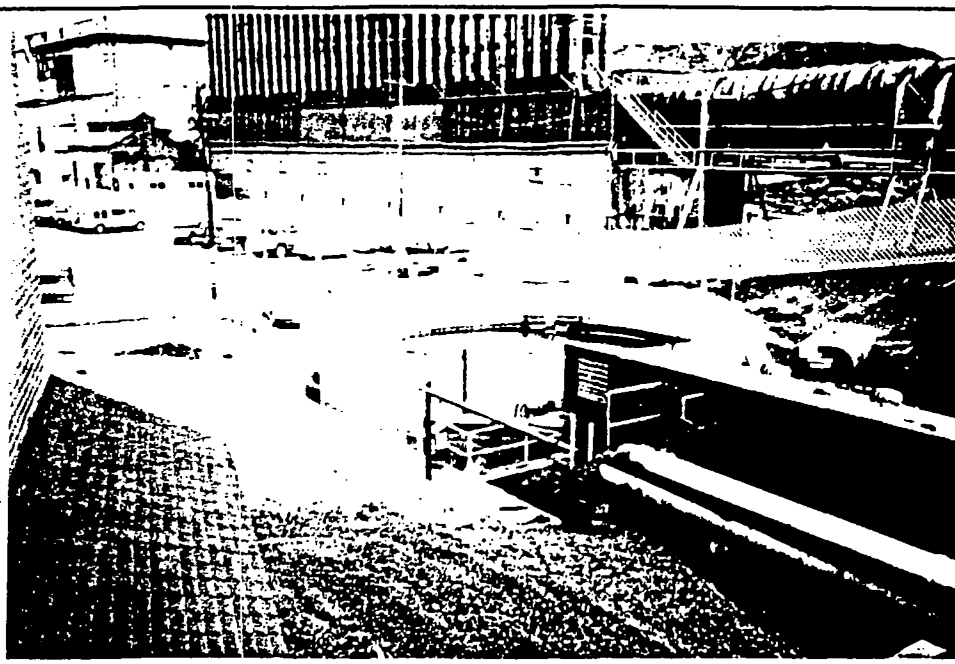
Time: 0930

General Direction Faced: NE

Weather Conditions: Overcast w/ light snow

Type of Camera: Kodak

Comments: Lower Lake in foreground with 1-million gallon Lower Lake tanks visible above building in mid-picture.



Picture No. 22 of 24

Date: 4/5/94

Time: 0930

General Direction Faced: N

Weather Conditions: Overcast w/ light snow

Type of Camera: Kodak

Comments: Thornock tank with sediment retention wall visible in middl of tank.